Amendments to the Claims

The listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) An equilibration method for very high resolution, three-dimensional imaging of pulmonary compliance, wherein the method comprises:

delivering a predetermined volume of hyperpolarized noble gas to the conducting airways in each ventilated region of the pulmonary system having an inflated, sealed lung or during a lung-inflating held breath;

measuring volume of local concentrations of the hyperpolarized noble gas in the airways by high resolution, three-dimensional [~~and collecting~~] local magnetic resonance imaging [~~image data therefrom~~], wherein the lung is segmented using scale-based fuzzy connectedness; and

calculating local pulmonary compliance from distribution of tidal volume.

2. (Original) The method of claim 1, wherein the noble gas is hyperpolarized helium-3 gas (H^3He).

3. (Original) The method of claim 2, further comprising dividing the lung images into as many distinct voxels as imaging resolution permits.

4. (Original) The method of claim 3, further comprising calculating local lung volume by dividing average signal intensity in each voxel by tracheal signal intensity.

5. (Original) The method of claim 4, further comprising calculating average concentration of H^3He in each voxel by dividing an amount of H^3He in each voxel by volume of the voxel, and calculating amount of H^3He in each the voxel by multiplying concentration of H^3He in the gas space of the voxel by volume of gas space in the voxel.

6. (Original) The method of claim 5, further comprising calculating compliance of the voxel by calculating pressure difference between alveolar gas inside the voxel and pleural space outside of the lung, and calculating local compliance in the voxel by dividing the volume of the voxel by transmural pressure gradient (tracheal minus esophageal pressures).

7. (Currently Amended) An equilibration method for very high resolution, three-dimensional imaging of distribution of functional residual capacity (FRC) in the lung using hyperpolarized noble gas, wherein the method comprises:

delivering a predetermined volume of hyperpolarized noble gas to the conducting airways in each ventilated region of the pulmonary system;

measuring volume of local concentrations of the hyperpolarized noble gas by high resolution, three-dimensional [~~and collecting~~] local magnetic resonance imaging [~~image data therefrom~~], wherein the lung is segmented using scale-based fuzzy connectedness; and

determining whole lung volume based upon the local measurements.

8. (Original) The method of claim 7, wherein the noble gas is hyperpolarized helium-3 gas (H^3He).

9. (Original) The method of claim 8, further comprising dividing the lung images into as many distinct voxels as imaging resolution permits.

10. (Original) The method of claim 9, further comprising, calculating local lung volume by dividing average signal intensity in each voxel by tracheal signal intensity.

11. (Original) The method of claim 10, further comprising calculating average concentration of H^3He in each voxel by dividing an amount of H^3He in each voxel by volume of the voxel, and calculating amount of H^3He in each the voxel by multiplying concentration of H^3He in the gas space of the voxel by volume of gas space in the voxel.

12. (Original) The method of claim 11, further comprising calculating local FRC by dividing signal intensity in the voxel by tracheal signal intensity, and then multiplying by volume of the voxel.

13. (Original) The method of measuring whole lung FRC by summing all local FRC in each voxel acquired in accordance with claim 12.

14. (Currently Amended) An equilibration method for very high resolution, three-dimensional imaging of pulmonary compliance and distribution of functional residual capacity (FRC) in the lung using hyperpolarized noble gas, wherein the method comprises:

delivering a predetermined volume of hyperpolarized noble gas to the conducting airways in each ventilated region of the pulmonary system having an inflated, sealed lung or during a lung-inflating held breath;

measuring volume of local concentrations of the hyperpolarized noble gas in the airways by high resolution, three-dimensional [~~and collecting~~] local magnetic resonance

imaging [~~image data therefrom~~], wherein the lung is segmented using scale-based fuzzy connectedness;

calculating local pulmonary compliance from distribution of tidal volume, and;

determining whole lung volume based upon the local measurements.

15. (Original) The method of claim 14, wherein the noble gas is hyperpolarized helium-3 gas (H^3He).

16. (Original) The method of claim 15, further comprising dividing the lung images into as many distinct voxels as imaging resolution permits.

17. (Original) The method of claim 16, further comprising calculating local lung volume by dividing average signal intensity in each voxel by tracheal signal intensity.

18. (Original) The method of claim 17, further comprising calculating average concentration of H^3He in each voxel by dividing an amount of H^3He in each voxel by volume of the voxel, and calculating amount of H^3He in each the voxel by multiplying concentration of H^3He in the gas space of the voxel by volume of gas space in the voxel.

19. (Original) The method of claim 18, further comprising calculating local FRC by dividing signal intensity in the voxel by tracheal signal intensity, and then multiplying by volume of the voxel.

20. (Original) The method of claim 19, further comprising calculating compliance of the voxel by calculating pressure difference between alveolar gas inside the voxel and pleural space outside of the lung, and calculating local compliance in the voxel by dividing the volume of the voxel by transmural pressure gradient (tracheal minus esophageal pressures).

21. (Original) The method of claim 15, wherein the method for very high resolution, three-dimensional imaging of pulmonary compliance and distribution of functional residual capacity (FRC) in the lung using H^3He is applied to the pulmonary system of a mammalian subject.

22. (Original) The method of claim 21, wherein the mammalian subject is human.

23. (Original) The method of claim 21, wherein the lung is normal.

24. (Original) The method of claim 21, wherein the lung is injured or diseased.

Claims 25-28 cancelled.